

3. SITE-SPECIFIC RISK-BASED END STATE DESCRIPTION

Section 3 provides information on physical characteristics, human and ecological land use, legal ownership, and population of the INEEL Site and adjacent lands. Maps showing current conditions and anticipated conditions at the end state follow each section of narrative.

3.1 Physical and Surface Interface

A map showing the physical configuration of the INEEL Site is provided as Figure 3-1a.

INEEL land consists of flat-to-gently-rolling, high-desert terrain that lies about 5,000 ft above sea level. Isolated buttes on INEEL land reach 6,572 ft. Vast sagebrush flats with outcroppings of basalt rock dominate the INEEL landscape.

Surface water at the INEEL Site is generally scarce. Intermittently flowing waters in the Big Lost River and Birch Creek flow to the Big Lost River Sinks in the northwest portion of the INEEL Site, where the water evaporates or infiltrates into the aquifer. Typically, however, irrigation demands drain these streams before they reach the Site. Water from Birch Creek is diverted during the nonirrigation season to produce hydropower before reaching the INEEL Site. Excess water from the hydropower plant flows onto the Site through a canal. Surface water occurs in channels and playas across the Site during spring run-off and provides an important water source for the local fauna and migratory species. No surface water flows off the INEEL Site.

Although surface water is scarce at the INEEL Site, subsurface water is plentiful. The Site lies over part of the Snake River Plain Aquifer, the largest aquifer in Idaho and one of the most productive in the nation. The aquifer is the source of water used at the INEEL Site. Protection of the aquifer is one of the primary environmental concerns governing INEEL operations. The Site has an extensive network of wells used for monitoring perched groundwater and the aquifer.

The INEEL Site is crossed by several highways, a rail system, and a high-voltage power distribution loop. Public access is restricted by fences, signs, and a number of manned guard gates. Although the total INEEL land mass is 890 square miles, most of the work at the INEEL is performed within the Site's primary facility areas, which are summarized below:

- TAN—TAN was originally built to develop and test designs for nuclear-powered aircraft engines. Other subsequent missions included reactor safety testing and behavior studies and storage of material from the 1979 Three-Mile Island reactor accident. Now, the major project at TAN is the Specific Manufacturing Capability, which develops and manufactures armor for U.S. Army military vehicles. Many historic buildings remain from the facilities' rich history.
- INTEC—Facilities at INTEC are used to store spent nuclear fuel, hazardous waste, mixed waste, and radioactive waste; treat radioactive waste; and develop waste management technologies. Current work at INTEC includes treating and disposing of radioactive liquid waste in the tank farm, identifying a disposal path for the calcine, and consolidating spent nuclear fuel into dry storage.
- RWMC—RWMC provides a disposal facility for LLW at the SDA and interim storage and management for approximately 62,000 m³ of transuranic waste in the Transuranic Storage Area (TSA). The stored waste will be shipped to the Waste Isolation Pilot Plant in New

Mexico. Mixed transuranic waste in storage will be prepared for shipment at the newly constructed Advanced Mixed Waste Treatment Facility.

- Central Facilities Area (CFA)—CFA is the main service and support center for the INEEL Site's programs and facilities. Support services include environmental monitoring and calibration laboratories, communication systems, security, fire protection, medical services, warehouses, a cafeteria, vehicle and equipment pools, power distribution, bus operations, and vehicle maintenance. CERCLA cleanup activities at this area are nearly complete.
- Waste Reduction Operations Complex (WROC), Power Burst Facility (PBF), and Auxiliary Reactor Area (ARA)—This area originally supported two reactor facilities: PBF and ARA. DD&D of the PBF reactor and supporting facilities is in progress. WROC includes waste storage facilities and a mixed waste incinerator. RCRA closure of the incinerator was completed, and the certification was approved by the State of Idaho on October 7, 2003.
- TRA—The primary mission at TRA is researching the effect of radiation of materials and producing radioisotopes for medical industry and research applications through operation of the ATR. Spent nuclear fuel is stored under water in the ATR canal. CERCLA cleanup activities at TRA are nearly complete.
- ANL-W—For the past 50 years, ANL-W has been the prime center in the United States for research on advanced reactor systems and their associated technologies. The mission of the laboratory is to conduct basic and applied research that supports these systems, with a current emphasis on development of new ways to deal with spent nuclear fuel.
- Naval Reactors Facility (NRF)—Bechtel Bettis, Inc., operates NRF for the DOE Office of Naval Reactors. NRF is located on the INEEL Site, 6.7 miles from the nearest INEEL boundary. The developed portion within the security fence covers approximately 84 of the 4,400 acres of NRF. NRF is not accessible to the general public.

NRF examines developmental nuclear fuel material samples, naval spent fuel, and irradiated reactor plant components and materials. The knowledge gained from these examinations is used to evaluate the performance of existing reactors and to improve reactor core designs. The examination of spent fuel at NRF has led to the design of longer-lived cores, which improves ship operations, reduces lifetime costs, and results in the creation of less spent fuel requiring disposition. NRF is also preparing spent nuclear fuel for dry storage. Historically, NRF operated prototype reactors for training naval students.

NRF will remain in operation for many years. No change in land use is planned. Current cleanup activities were completed on June 3, 2003, in accordance with CERCLA risk-based cleanup standards, and caps will be installed in three areas over the next 2 years. Any required future decontamination and decommissioning activities will be performed in accordance with applicable regulatory agreements and requirements to ensure that human health and environment are protected. No further action is required at this time with respect to developing risk-based end states for NRF. NRF is not discussed further in this document.

Figure 3-1a represents the end state as well as the current state of the INEEL Site. Although physical features will change significantly in certain developed portions of the Site, they are not visible on Figure 3-1a because of the scale of this map. Changes to specific developed areas of the Site are more thoroughly described in Section 4 of this report.

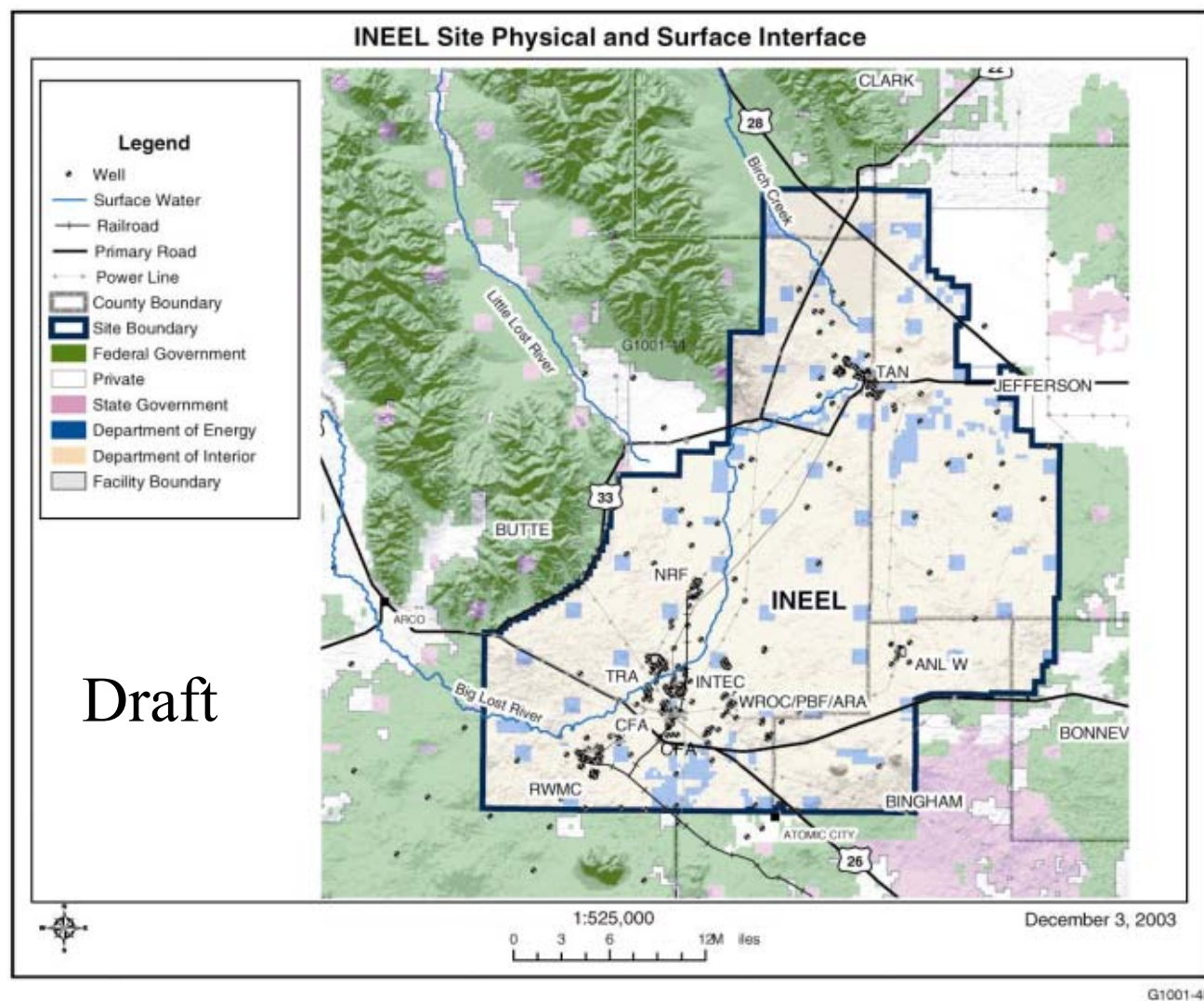


Figure 3-1a. Site physical and surface interface—current state.

3.2 Human and Ecological Land Use

Acreage within the INEEL is classified as industrial and mixed use by the U.S. Department of the Interior Bureau of Land Management (BLM). Most of the work at the INEEL is performed within the Site's discrete primary facility areas. The great majority of the Site is undeveloped. Restricted access to INEEL land provides protection of important ecological and cultural resources. A map showing current and end state land use is provided as Figure 3-2a. There are no differences between the current and end states, as the current land uses described below are expected to remain the same at the end of the EM cleanup mission.

3.2.1 Ecological Resources Preservation

The INEEL Site is located at the mouth of several mountain valleys through which large numbers of migratory birds of prey and mammals are funneled onto the Site. During some years, hundreds of birds of prey and thousands of pronghorn antelope and sage grouse live year round or winter on the INEEL Site. About 30% of Idaho's pronghorn antelope population uses the INEEL Site as a winter range. Mule deer and elk also reside on the Site. Predators observed on the Site include bobcats, mountain lions, badgers, and coyotes. In all, over 270 vertebrate species have been observed, including 43 mammal, 210 bird, 11 reptile, nine fish, and two amphibian species. Currently, no threatened or endangered species are found at the Site (DOE-ID 2003a).

Aquatic communities on the INEEL depend largely on the flow of the Big Lost River. The river flows intermittently across about 30 miles of the INEEL from southwest to north before it terminates in the Big Lost River Sinks. No water reaches the INEEL section of the Big Lost River during drought years or during periods when water is diverted upstream of the INEEL for agricultural and flood prevention purposes.

The INEEL Site contains one of the largest areas of undeveloped and ungrazed sagebrush steppe outside of national park lands in the Intermountain West. In 1999, a portion of the INEEL was designated a Sagebrush-Steppe Ecosystem Reserve. This designation supports continued protection of ecological resources at the INEEL.

A management plan for the INEEL Sagebrush-Steppe Ecosystem Reserve has been drafted by the BLM and DOE with input from the Idaho Department of Fish and Game, U.S. Fish and Wildlife Service, and the Shoshone-Bannock tribes. The draft management plan discusses wildfire suppression, livestock grazing, road management, weed control, and protection of cultural resources.

3.2.2 Cultural Resources Preservation

Many INEEL cultural resources are eligible for nomination to the National Register of Historic Places and include artifacts, sites, structures, and properties that represent several periods of Southern Idaho prehistory and history. Cultural resource management activities at the INEEL have been ongoing for more than 40 years.^a In that time, approximately 7.5% (43,145 acres) of the undeveloped portion of the 890-square-mile facility has been systematically surveyed, the buildings have been evaluated for their historical significance, and local tribal people whose aboriginal homelands included the INEEL (Shoshone-Bannock) have become active participants in cultural resource management. Inventories of

a. DOE-ID, 2002b, "INEEL Cultural Resource Management Plan (Draft)," DOE/ID-10997, Rev. A, U.S. Department of Energy Idaho Operations Office, September 2003.

other INEEL property types (such as historic objects, structures, and records and Native American sacred sites) are ongoing.

Archaeological sites reflecting thousands of years of use by hunting and gathering cultures and several centuries of farming, ranching, and other emigrant activities number nearly 2,000 in the inventories that have been completed. Ongoing communication and cooperation between DOE and the Shoshone-Bannock tribes under the *Agreement-in-Principle between the Shoshone-Bannock Tribes and the United States Department of Energy* (DOE 2002c) have shown that many archaeological sites in the region are regarded as ancestral and important to tribal culture. Natural landforms and native plants and animals of the INEEL region are also of sacred and traditional importance, and although rare, human burials are of special concern. In recognition of these unique tribal values, DOE provides tribal members with unrestricted access to certain areas of the INEEL for activities related to the maintenance of tribal heritage, education of tribal members, and exercise of traditional cultural activities (DOE 2002c). Communication and interaction are ongoing, and the tribes actively participate in the preservation of these important resources.

In addition to archaeological sites and artifacts, many more recent historic architectural properties exist on the INEEL. Of the more than 500 buildings surveyed, 215 are historical and one, the Experimental Breeder Reactor I, is a National Historic Landmark. It is open daily for public tours from Memorial Day through Labor Day.

Strategies for the effective management of INEEL cultural resources have been developed in conjunction with pertinent INEEL programs and are detailed in the “INEEL Cultural Resource Management Plan (Draft)” (see footnote a) and the *INEEL Historic Architectural Properties Management Plan* (Braun 2003).

3.2.3 Environmental Research

As the shutdown of INEEL facilities and environmental restoration of INEEL land play greater roles, environmental studies are becoming increasingly important elements of land-use planning. These studies provide INEEL scientists, engineers, and planners with information about how nuclear reactor research has affected the environment and the extent of remediation necessary to restore the land. In addition, INEEL scientists and engineers are researching and developing technologies to mitigate the effects of environmental contamination and to preserve the environment during current and future INEEL operations. An extensive environmental surveillance program is in place for air, soil, surface and subsurface water, big game animals, and local produce (e.g., potatoes, wheat, lettuce, and dairy milk) for the INEEL Site and surrounding areas.

The INEEL Site was designated a National Environmental Research Park in 1975. The DOE has established seven such parks within the DOE laboratory complex. The parks are field laboratories set aside for ecological research and the study of environmental impacts from nuclear energy development. National Environmental Research Parks also help fulfill the DOE's policy for good stewardship of its land by supplying research and data needed for proper land management. Research results are published in reports, peer-review journals, and conference proceedings. These publications provide data necessary to support ecological risk assessments and National Environmental Policy Act documentation.

3.2.4 Grazing

The amount of INEEL land used for grazing varies from year to year, but between 300,000 and 341,000 of the site's nearly 569,600 acres are generally used for cattle and sheep grazing. A 900-acre portion of this land, located at the junction of Idaho State Highways 28 and 33, is used by the U.S. Sheep

Experiment Station as a winter feedlot for about 6,500 sheep. No grazing occurs within 1/2 mile of any primary facility area boundaries.

Rights of way and grazing permits for INEEL lands are granted and administered by the BLM. Thirty-four ranchers currently hold grazing permits on INEEL land.

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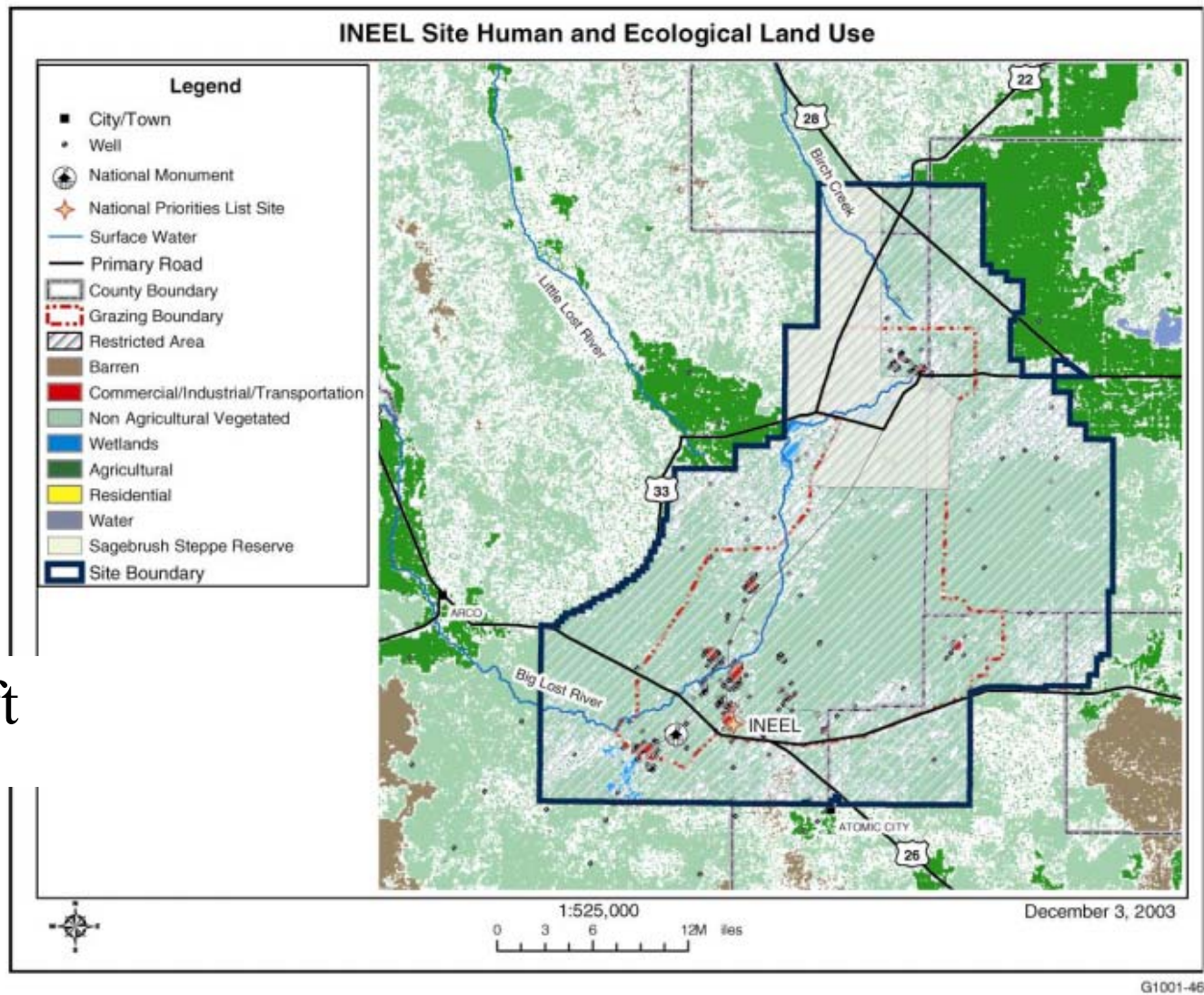


Figure 3-2a. Site human and ecological land-use map—current state.

3.2.5 Hunting

Controlled hunting also is permitted on INEEL land but is restricted to 1/2 mile inside the boundary. Each year, the Idaho Department of Fish and Game and the DOE determine whether to allow controlled hunts of wild game populations on INEEL land. The purpose of these hunts is to reduce potential movement of animals off INEEL property and onto private lands where crops may be damaged. Hunts have so far been restricted to pronghorn antelope, elk, and coyotes.

3.3 Site Context Legal Ownership

In November 1947, the Atomic Energy Commission (now the DOE) began examining the pros and cons of developing a site where nuclear research reactors could be constructed to augment those at Hanford, Washington. The Commission found the Idaho site attractive for reasons that included its remote location, soil that afforded good drainage without rapid run-off, and the fact that it was already the site of the Arco Naval Proving Ground.

The Commission approved the Idaho site as its new research reservation on March 1, 1949. The acquisition proceedings lasted several more months, culminating in a presidential directive that transferred the Arco Naval Proving Ground to the jurisdiction of the Atomic Energy Commission. In subsequent years, this land was augmented through a series of withdrawals from the public domain and purchases of state and private lands.

Between 1946 and 1958, a total of 505,832 acres (89% of the current-day INEEL Site) were withdrawn from the public domain through a series of decrees called public land orders. Even though withdrawn lands were transferred to the INEEL, the public land orders provide for certain responsibilities to remain with the BLM, including the administration of grazing permits on the INEEL Site, granting utility rights of way across INEEL land, extracting materials, and controlling wildfires, weeds, insects, and predators. However, the public land orders also require that the DOE be consulted before final decisions are made about these actions.

Several parcels of state-owned land that amounted to 21,308 acres and 43,275 acres of land acquired from private parties were interspersed with land that was withdrawn from the public domain to form the INEEL Site. The Commission obtained these parcels to form a totally intact land area for the INEEL Site.

The land area for the INEEL Site totaled 570,415 acres at the culmination of land acquisitions and resulted in a unified site area. Subsequently, however, a transfer in January 1994 of 1,120 acres and a transfer in 1997 of 160 acres were made to the BLM, which in turn sold the land to Jefferson County to enable them to establish a multicounty landfill. The current-day INEEL land area consists of 569,135 acres (889 square miles).

INEEL land purchased by DOE from the State of Idaho and from private parties is owned by DOE. INEEL land obtained through land withdrawals is owned by the BLM. DOE has the right to conduct its missions on BLM land within the INEEL boundary until such time as the land is no longer needed by DOE. DOE currently has no end date projection for use of INEEL land within the current Site boundary. Accordingly, INEEL land ownership as it exists today is forecasted to be the same in 2035 and beyond. Legal ownership of the INEEL Site is shown in Figure 3-3a.

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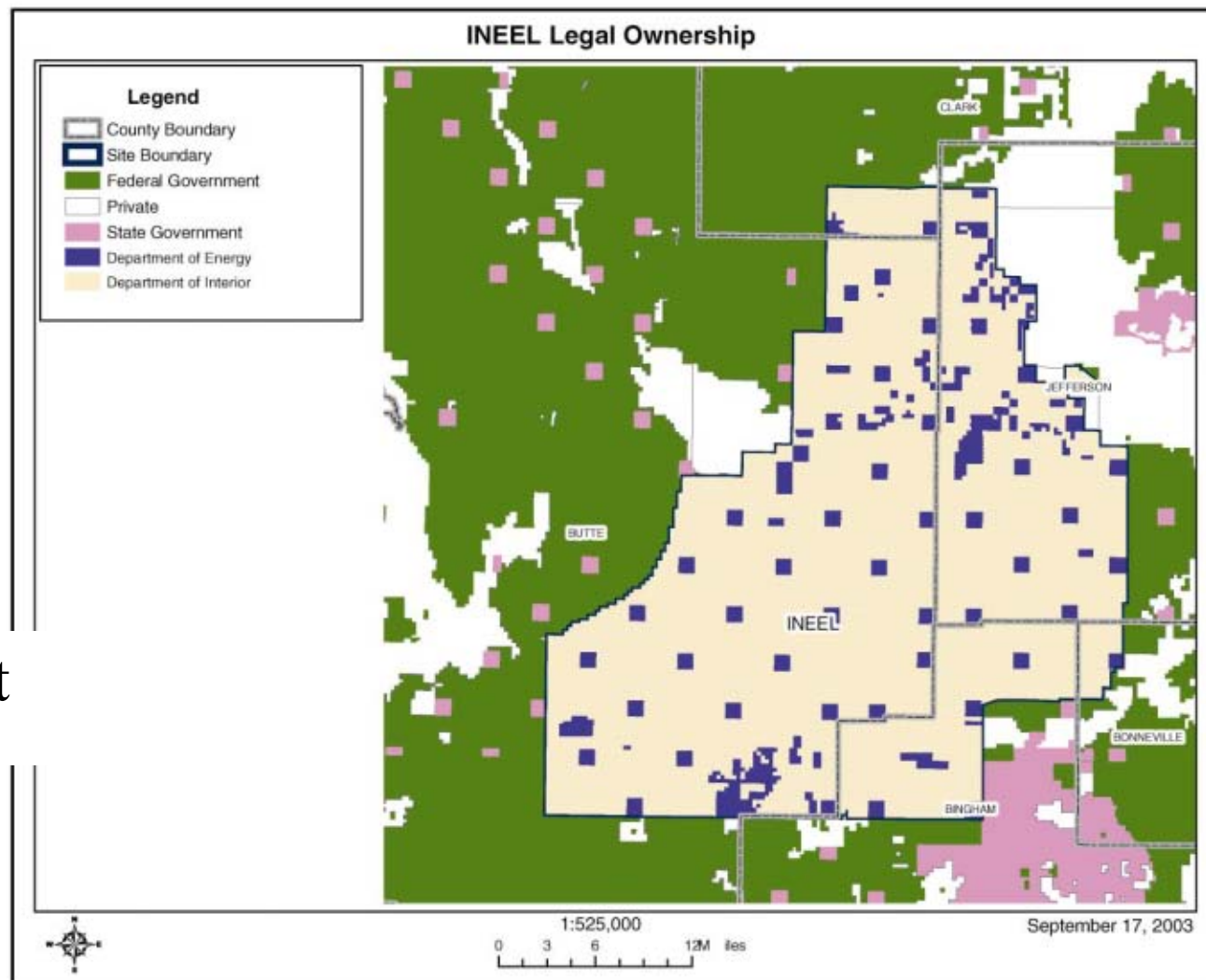


Figure 3-3a. Site legal ownership—current state.

3.4 Site Context Demographics

A map showing the population in the immediate vicinity of the INEEL Site (based on the U.S. Census data for 2000) is provided as Figure 3-4a. Current population centers in the region are shown on Figure 2-2a.

The rural population immediately surrounding the Site is sparse, with most counties ranging from 15 to 62 individuals per square mile. Butte County has the lowest population density at 1.3 individuals per square mile. Bonneville County, with the City of Idaho Falls as its population center, has 44.2 individuals per square mile. Most of the land next to the Site is open land owned by the BLM and therefore not available for residential use. Private land next to the Site is primarily used for single-family farms, ranches, and residences. Several small, agricultural towns, with populations less than 1,000, flank the Site boundary. The towns of Arco, Butte City, Moore, and Howe are located to the west of the Site in Butte County, while the towns of Montevue, Mud Lake, and Terreton are located east of the Site in Jefferson County. Atomic City is located south of the Site in Bingham County. Detailed statistical information on Idaho is available from the U.S. Census website, <http://www.census.gov/>, or the State of Idaho homepage, <http://www.state.id.us/>.

The INEEL work force peaked at 11,961 employees in 1995 but has steadily decreased since then. Approximately 8,000 people currently work at the INEEL. Approximately 65%, or 5,300 individuals, commute to the desert Site on weekdays, returning home each evening. During the weekends, the INEEL maintains a skeleton crew; however, there are no permanent residents living within the boundaries of the INEEL. The INEEL work force resides primarily in Bonneville County to the east of the Site, with Bingham, Bannock, Butte, Jefferson, and Madison Counties and the Shoshone-Bannock Reservation also contributing to the worker population.

Figure 2-2b shows the anticipated population in the vicinity of the INEEL Site at the end of the EM cleanup mission. In order to make projections on population density in the 2035 timeframe, several sources of information were used. Some population forecasts for 2010 are available from the U.S. Census website. Two population forecast reports prepared by Intermountain Demographics of Boise, Idaho, provide information on anticipated population growth through 2015 for Bonneville County and through 2020 for Bannock County (Intermountain Demographics 1996; Intermountain Demographics 2000). Information also was gathered from discussions with county planning and zoning commissioners for Fremont, Jefferson, Butte, Bannock, Bonneville, and Madison Counties and with planning and zoning departments for the cities of Idaho Falls, Pocatello, Blackfoot, and Rexburg.

It is not expected that significant population growth will occur in rural areas in Butte, Jefferson, Clark, and Bingham Counties. Most of the arable land surrounding the Site has been or is in production, and it is anticipated that no new arable land will go into production by 2035. Agriculture in the area is constrained by lava flows, temperature extremes that characterize high desert plateaus, and availability of surface and aquifer water for irrigation. Southeast Idaho has endured severe droughts in the past, and the current drought has affected areas next to the INEEL. The U.S. Census website predicts a 0.05% decrease in the Butte County population by 2010. If severe drought continues, some informal estimates by county planning and zoning commissioners predict a regional population decline of 2% by 2035. If moisture returns, the forecast is for stable population densities in most counties next to the INEEL. Therefore, Figure 3-4a also represents the anticipated end state population in the vicinity of the Site.

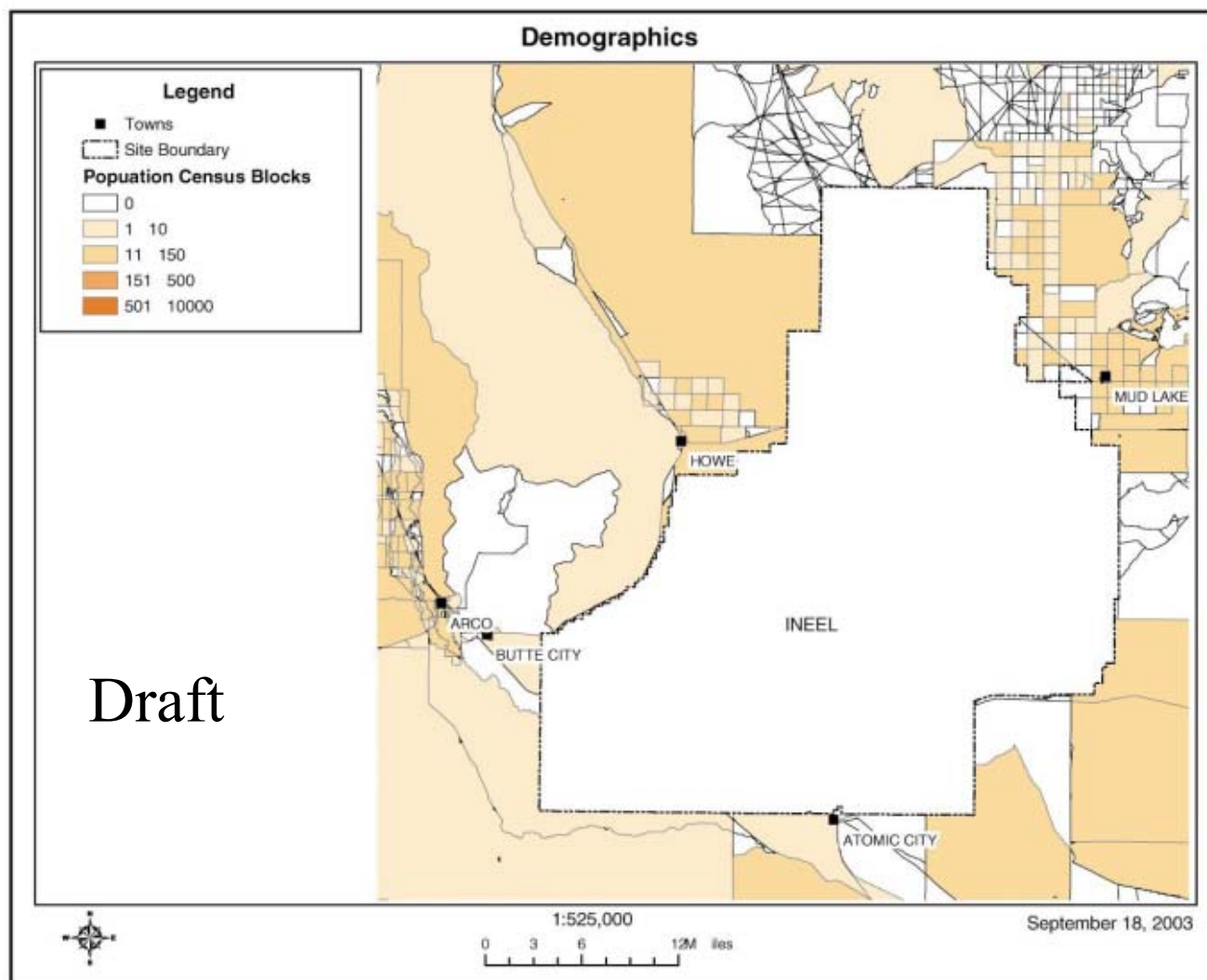


Figure 3-4a. Site demographics—current state.

As the EM cleanup work scope is completed, it is anticipated that reductions in the EM work force will continue. Employment reductions also are expected to occur in response to increased outsourcing of employees. In September 2000, the subcontractor number was 14, in comparison to 209 individuals for 2003, indicating an increase in outsourcing. It is not possible to predict the size of the work force that will be needed to support the NE mission in 2035, as the NE 10-year plan for the INEEL is just being developed and projections as far out as 2035 are not available.

Changes to the INEEL work force were predicted in the *2000, 2005, 2010, and 2015 Employment, Population, and Household Forecasts for Bonneville Metropolitan Planning Organization* (Intermountain Demographics 1996). "In this analysis, it was assumed that Bonneville County INEEL employment would decrease 4 percent annually, a rate slightly lower than the 1990 to 1995 annual rate." In the 2000 employment forecast, it was assumed that all of that employment reduction would occur in Bonneville County. Reductions in INEEL employment were forecast to cause additional employment reductions in the service, retail trade, and government employment sectors. Every basic job was estimated to support 2.59 additional jobs. Conversely, for every basic job reduction, 2.59 jobs were withdrawn from the employment forecast. For instance, in Fiscal Year 2002, the INEEL reduced its work force by 433 employees. The impact of that reduction is estimated at an additional 1,148 employees.

Nevertheless, because of continued economic diversification, some growth is anticipated in Bonneville County, Bannock County, and Madison County. In 2000, Bonneville County had 87,261 residents, and the forecast for 2015 is 108,455, a 7.1% increase (Intermountain Demographics 1996). Local planning and zoning representatives estimated that by 2035, the population of Bonneville County could reach 130,000. In 2000, Bannock County had a population of 70,100. The forecast population for 2020 is 89,900 (Intermountain Demographics 2002). Local planning and zoning representatives indicated that the population in Bannock County would probably reach 94,000 by 2035. Half of the projected population growth is expected to occur in Pocatello. Madison County had a count of 27,467 individuals in 2000, a 16% increase from the 1990 census figures. It is expected that Madison County will continue to grow at that rate during the forecast period, because of the addition of the 4-year college (BYU Idaho), the professionals the college will attract, and the increase in housing at the north end of the county by retirees attracted to recreational activities. These population increases are shown on Figure 2-2b.